**"Coast-Guard Involvement with High-Speed Craft:
Past, Present, Future"**

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Introduction.

Good morning ladies and gentlemen. It is a pleasure for me to be at this conference to talk about the U.S. Coast Guard's current activities and future plans relating to High Speed Craft (HSC) operations in the United States. I've taken the liberty of changing the title for this presentation because the assigned title, "What the Coast Guard is Doing About High Speed Craft", may be misleading, suggesting that the Coast Guard has not been actively engaged on this issue. This is far from the truth. Because the number of high-speed craft were so few in the past, the Coast Guard had been able to deal with each vessel on an individual basis. Until only recently, vessel speed was not a real concern. Now, however, with an increasing number of high-speed craft operations in the U.S., this issue has come to the forefront. The increase in HSC operations coupled with ever increasing waterway congestion leads to obvious safety concerns; speed is now an issue. So, I take this opportunity to explain the Coast Guard's history, recent activities and future plans regarding high-speed craft.

History of High Speed Craft Operations in the U.S.

During the 1950s and '60s we saw great technology improvements in vessel hull design and propulsion systems aimed primarily at improving vessel speed. Hydrofoils, surface effect ships, hovercraft and wing-in-ground effect vessels all came into existence, as did marine gas turbines and waterjet propulsion. At the outset, this technology was used primarily in military applications. Commercial applications were quite limited, particularly in the U.S., due to the high costs associated with the design, outfitting and operation of vessels having these technologies.

Commercial high-speed craft operations began in the U.S. around the mid-1960's, but suffice it to say, these efforts were short-lived. The first U.S. high-speed ferry operation came during the time of the 1964 World's Fair in New York, when a 30 knot hydrofoil ran from East 26th Street Manhattan to the Fair near Flushing Bay, Queens. Later, in the early 1970's, gas turbine-monohulls, equipped with waterjet propulsion, were operating as fast ferries in San Francisco Bay. Also, around that same time, there were two Boeing hydrofoils (jetfoils) operating on a ferry route between Seattle and Victoria. These ventures only lasted a short time. The New York operation disbanded around the same time the World's Fairs ended. The San Francisco ferries operated as fast ferries only for a few years, while fuel prices were still low, then converted to diesel power in the mid-1980's. The Boeing jetfoils operated only for a few years then were sold foreign, along with 20 or so other jetfoils that were built by Boeing in that era.

The 1980s saw further technology improvements that paved the way for more viable high-speed craft alternatives. High-speed catamarans of aluminum construction, with waterjet propulsion systems driven by diesel engines, became the design of choice for obvious reasons. Compared to dynamically-supported craft, they were relatively simple to design and build and, more importantly, they were cost effective to operate. By the late 1980's, with lower fuel costs and increased highway congestion problems, there came a realization in the U.S. that HSC could offer a viable transportation alternative.

By 1990, the Coast Guard was dealing domestically with about ten dynamically supported craft and about twenty-five catamarans that fit the HSC Code definition of a high-speed craft. Since that time the number of catamarans has grown significantly while the number of hydrofoils and hovercraft has remained low.

As with all alternative vessel designs, the Coast Guard has been actively engaged in the safety of high-speed craft since the first commercial high speed ferry operation in 1964. Until only recently, most, if not all, high speed craft operating in the U.S. measured less than 100 gross tons. Thus, they were required to meet the small passenger vessel regulations of 46 CFR, Subchapter T. In 1977, the Dynamically Supported Craft (DSC) Code came along, originating from the International Maritime Organization (IMO). Although the U.S. never formally recognized the DSC Code, portions of the Code were applied to many of these vessels, where it was thought by OCMIs to be reasonable and prudent. For dynamically supported craft, two licensed operators were required on the bridge at all times. Operators were also required to complete special training and to hold radar endorsements.

During the long development of the new small passenger vessel regulations the Coast Guard revealed its position on both the DSC and HSC Codes, in application to new vessels, through the various notices of rulemaking. Our initial position was that certain vessels would have to comply with portions of the DSC Code. However, by the time the final rulemaking came along in 1996, the High Speed Craft (HSC) Code, which also became effective in 1996, had replaced the DSC Code. In the final rule, no vessels were specifically required to apply the DSC or HSC Code. Instead, the HSC Code, when applied in its entirety, is offered as an alternative to meeting the small passenger vessel regulations.

Current Situation.

To this point, the HSC Code has seen limited use in the United States. Currently, there are four U.S. flag HSC Code vessels operating in the United States. Three vessels constructed at Pequot River Shipworks in Connecticut have been reviewed for compliance with the HSC Code. The SASSACUS, being less than 100 gross tons, was granted equivalency to the small passenger vessel regulations for vessels carrying more than 150 passengers as provided in 46 CFR, Subchapter K. For the TATOBAM, which measures over 100 gross tons, the Coast Guard granted a special equivalency to the large passenger vessel regulations as allowed under the equivalency provisions of 46 CFR, Subchapter H. The same special equivalency is being pursued for the THOMAS

EDISON, which also measures over 100 GT. One other vessel, the FOILCAT, just began operation in the Hawaiian Islands. It was built in 1992 to the DSC Code under a foreign flag and upgraded to meet the HSC Code in order to re-flag U.S. Presently, the Coast Guard knows of no other HSC Code vessels planned for construction in U.S. shipyards. We also expect that foreign-flag high-speed craft operations will remain limited. However, we continue to see a steady pace of non-Code HSC being built in the United States for U.S. operations.

Source: USCG Marine Safety Center, Hull Division

The above chart illustrates the continued growth trend for high-speed craft. This growth is expected to continue with construction contracts pending on at least 15 new high-speed craft.

With this anticipated growth come new challenges with regard to the safety of high-speed craft. Not only are we seeing a growth in the number of high-speed craft, we continue to see a steady growth in waterway users. In a recent report to Congress on the Marine Transportation System (MTS), the Department of Transportation cites certain critical issues we will face over the next 20 years. Among them include the doubling of domestic and international marine trade, a 65% growth of recreational boating users, expansion of high speed ferry transportation in response to road congestion, and the rise of passenger travel on cruise ships. With the rapid expansion of trade, wealth, and recreational opportunities in recent years, many waterways are being stretched to their limits to cope with the size, speed, and diversity of craft and users of the MTS.

It is clearly recognized that human factors contribute to MTS-related accidents. The growth of the U.S. MTS and corresponding growth of waterway users points to greater human factors concerns. Although casualty history does not point to HSC operations being a significantly greater risk when compared to conventional vessels, recent risk

studies indicate that HSC present a much greater risk. A recent formal safety assessment conducted by the British Maritime and Coast Guard Agency (MCA) concludes that the projected accident rate for HSC is nearly five times that of conventional craft, due primarily to the increased risk of collision in high-density traffic areas. The results of this formal safety assessment give credence to the growing concerns about the safety of high-speed craft. These concerns point toward the safe operation of high speed craft, which leads us to human element concerns.

The need for speed drives the design of HSC to new limits; often employing new technologies that may not have been contemplated when the regulations were first written. The HSC Code addresses many of the safety issues, at least at the internal or micro-level, but the Code will not solve our problems. The Code does not address how to safely integrate high-speed craft operations into a congested waterway system; the external or macro-level problems. More significantly, however, the Code does not address over 95% of the high-speed craft operations in the United States because they operate domestically and are not required to comply with the Code. Since the Code must be applied in its entirety, it is unattractive to many domestic builders and operators. If a vessel is not operating on an international voyage, building a vessel to the HSC Code may offer some benefits, such as being able to use lightweight composite materials, but also will result in the application of numerous additional safety features and operational restrictions, which result in increased costs.

This situation presents unique safety issues for the Coast Guard and HSC operators to consider. To address these issues, the Coast Guard has engaged in a number of initiatives aimed at controlling the risks presented by HSC operations.

Recent Initiatives:

The Coast Guard was actively involved in the development of the HSC Code at the IMO. The HSC Code is the most developed set of international rules for building and operating high-speed craft. The philosophy of the Code is based on "the management and reduction of risk as well as the traditional philosophy of passive protection in the event of an accident". The Code encourages mathematical analysis to assess risk and determine validity of safety measures imposed. The Coast Guard views the HSC Code and its philosophy as an effective instrument for regulating the design, outfitting, and operation of high speed craft, regardless of whether the craft is operated domestically or internationally.

To facilitate use of the HSC Code, the Coast Guard, in June this year, issued a Navigation and Vessel Inspection Circular (NVIC 6-99) that provides guidance on plan review, inspection, and certification for vessels built to the Code. The NVIC also offers a summary of additional measures and operational practices that are being applied to domestic, non-Code vessels on a local or regional level. Thus, the NVIC serves as guidance for both Code and non-Code vessels. The NVIC contains three enclosures. The first enclosure provides U.S. interpretations to specific sections of the HSC Code, where discretion is left "to the satisfaction of the Administration". The second enclosure is an

inspection checklist that can be used by Coast Guard inspectors and vessel operators alike to verify that a vessel complies with the Code. The third enclosure provides a collection of additional measures and observed practices for addressing the human factors and operational safety issues relating to high-speed craft. The issues presented in this final enclosure to the NVIC are the ones on which we continue to focus our main efforts.

Several groups have been formed to study the risks associated with high-speed craft and to develop or recommend guidance to mitigate the risks. At Coast Guard Headquarters, a High-Speed Craft Working Group has been in place since early1997, around the same time that construction began on the first U. S. flag HSC-Code vessel, the SASSACUS. The group, at first, focused primarily on the standards and enforcement issues related to the HSC Code, but has since been involved with issues relating to domestic, non-Code vessels. The group is comprised of members from our Quality Assurance Staff (G-MO-1), our Office of Design and Engineering Standards (G-MSE), our Office of Compliance (G-MOC), the National Maritime Center Licensing and Evaluation Division, the Marine Safety Center, and our Office of Waterways Management (G-MWP). For those familiar with the Coast Guard's organization, this group covers the full gamut of Coast Guard interests. The group developed the NVIC that I previously mentioned. They also assisted the field units with specific issues relating to the application and enforcement of the HSC Code, ensuring that the work of the field units would set the right precedents for future HSC Code vessels.

Also at the headquarters level, we had one of the travelling inspectors from our Quality Assurance Staff evaluate the operations of high speed craft operations in five major ports nationwide over the past year. The areas studied were Long Island Sound, San Francisco, Boston, New York City, and Seattle. The resulting trip reports offered detailed information on the operation of both Code and non-Code high speed craft, identifying the many issues and concerns that are common to these vessels and offering recommendations for addressing those issues. These recommendations helped form the basis for the guidance found in enclosure (3) of NVIC 6-99.

One of the first organized partnership efforts to address the safety of high-speed craft operations was the New York High Speed Commercial Craft Safety Board. This group, represented by CG Activities New York, 6 commercial firms, New York City DOT, and NY/NJ Port Authority, was formed in August of 1997 and actually initiated by the local industry. Their efforts focused on the safety of the non-Code high-speed craft operating in the New York city area. They concentrated on many of the risk control measures included in the HSC Code that are not specifically addressed in our domestic regulations. They produced a template for training and operations manuals. They also expanded on the risk control options identified by the U.K. Formal Safety Assessment aimed at reducing the risk of collision and identified some practical risk control measures for use in the New York metropolitan area. As a result of their efforts, some of these measures have already been voluntarily implemented at the local level.

In the spring of 1998, the First Coast Guard District developed their own HSC Work Group, to address more immediate regional concerns associated with the growth of high

speed ferry activities within the District. The District covers an area of responsibility from Northern New Jersey northward to the Canadian border. There are approximately 17 high-speed vessels currently operating within the District's area-of-responsibility, with several more anticipated within the next few years. The group is comprised of 1st District staff, representatives from the various field offices, and industry members having an interest in HSC operations. Their focus has been primarily on the operational safety issues. They have forwarded various proposals to Coast Guard headquarters, including recommendations on type-rating (training and certification) of high speed craft personnel, crew fitness requirements, navigational equipment requirements, and a template for operations manuals. Many of their proposals and ideas were considered during development of the HSC NVIC or have been taken up as ongoing initiatives at the headquarters level.

The Coast Guard also participates in the Passenger Vessel Association's High Speed Subcommittee, which is comprised of 8 to 10 association members with extensive experience in high-speed passenger vessel operations. The group's primary objective is to improve the safety of domestic high-speed passenger vessels. More specifically, they hope to: develop a user friendly definition of "high speed"; monitor the work of the various working groups; evaluate the effectiveness and practicality of safety proposals; keep abreast of issues and incidents relating to high speed craft, and; collect safety and risk data. Also, under the auspices of the PVA/CG Partnership Action Team, the Coast Guard signed a Natural Working Group Charter to examine the operational parameters of high speed passenger ferries currently in domestic service, which are not required to comply with the HSC Code. The Charter recognizes the advanced technologies and capabilities of these vessels, which places them in an operating environment requiring additional and sometimes unique training and operational controls. These parameters are inherent in the philosophy of, and specifically outlined in, the HSC Code, but only loosely tied to domestic regulations, which empower the local OCMI to require operational controls or additional safety equipment on vessels operating at high speed. Recognizing this disparity, domestic high-speed craft operators have taken it upon themselves to develop in-house specialized training programs and other controls to account for the unique operational nature of these vessels. The working group, which is comprised of a nationally diverse mix of current high-speed craft operators and Coast Guard personnel, is tasked to capture the existing operating experience and the voluntary controls that are currently in place by completing four consensus deliverables. They are: define the term "high-speed craft" for domestic use; develop specific standards for crew training and manning; develop an operations manual template, and; develop performance standards for navigation and communications equipment.

The Coast Guard has also asked the Navigation Safety Advisory Council (NAVSAC) for their input on the navigation and waterway safety issues relating to high speed craft operations. NAVSAC is looking at proposed changes to the rules of the road, which could make high-speed vessels the give-way vessel in approach situations involving risk of collision. They are also considering proposed changes that would create a special light requirement for high-speed vessels. These proposed changes would be brought up before the IMO as a result of initiatives by other nations. A recommendation by NAVSAC on

the steering/sailing rule change was tabled until the next meeting, Spring 2000, so that the pros/cons of changing the rules can be thought-out in more detail. There was general consensus that a special light (or system of lights) for high speed vessels was a reasonable idea.

Future Plans.

The aforementioned partnership groups all plan to continue their current activities into the foreseeable future. Although in some cases, these efforts may have overlapping objectives, the Coast Guard views this as vital to achieving our goal of reducing the risks associated with high speed craft operations. No one group can do it all. By having several groups involved, we ensure that all issues are covered and a variety of ideas and opinions are included. As an example, several groups are looking to provide a simple definition for the term "high-speed craft". If you consider the implications, this is not an easy task. The definition given by the HSC Code, which factors in the size of the vessel, may not be the most practical definition when applied to our domestic, non-Code high-speed craft fleet, which comprise more than ferry operations. Some groups may want to look only at vessel speed but deciding on what the appropriate speed should be has proven difficult. When the speed threshold is changed from 25 knots to 28 knots, the number of vessels that fall into the "high-speed" category changes drastically, reducing the numbers by more than half. If the definition is based solely on speed, what do we do about the smaller vessels, such as the airboats running trips on the bayous? Does size matter? This is just one example of the many difficult issues to resolve. The partnership groups are in place to help resolve them.

In addition to the various partnership efforts, there are a number of projects and initiatives underway at Coast Guard headquarters that relate to high-speed craft and risk control. Several offices within the Marine Safety Directorate have sponsored R&D projects that will provide the analytical tools necessary to ensure a systematic approach to our risk assessment and control efforts. These projects cover topics such as crew fatigue, risk-based decision making, performance-based crew training, and duty-based manning levels. The Coast Guard also continues to provide representation at the International Maritime Organization, where a number of revisions to the HSC Code are being considered. Some of the proposed revisions include: design collision loads; design standards for Wing-In-Ground (WIG) effect vessels; revisions to damage stability criteria; structural fire protection revisions; changes to evacuation requirements, and; human element revisions. Other activities at IMO relating to high-speed craft include a review of all Formal Safety Assessments conducted by member nations and further studies on fatigue issues.

The Coast Guard has also been proactive in responding to marine casualties or other significant incidents involving high-speed craft and plans to continue these efforts in the future. In December last year, Coast Guard Headquarters, Office of Compliance, sent a message to our field units providing collision avoidance recommendations and other "prudent mariner" advice to be relayed to the marine industry and boating public. It recognized some of the shortcomings of modern radar equipment, recommended use of

radar reflectors on vessels with non-metallic hulls, and addressed navigational safety issues relating to high speed craft such as the adequacy of sound signals, maintaining a proper lookout, and what defines “safe speed”. More recently, after a couple high-speed craft submerged theirs bows in only moderate seas, the Coast Guard Headquarters HSC Working Group has taken up discussion on the sea-keeping abilities of high-speed craft.

Aside from the efforts just mentioned, most of the Coast Guard’s activities are long-term efforts aimed at addressing the safety concerns associated with high-speed craft. It may take a year or more for the benefits of these efforts to be fully realized. In the near-term, the Coast Guard plans to issue additional guidance for vessels that comply with the HSC Code. Specifically, we plan to issue policy letters on type-rating and manning for HSC Code vessels.

For type-rating qualification, mariners will be required to complete a Coast Guard-approved course that will consist of both classroom and operational training. A course provider may elect to include optional simulator training as part of the course curriculum. The required operational training will be under the supervision of "qualified instructors" and assessment will be performed by "designated examiners". Basically, these individuals will be required to have a certain amount of experience in the operation of a particular HSC and hold a type-rating certificate for that craft. Upon satisfactory completion of the course, the training provider will issue a course completion certificate. With the course completion certificate, a physically qualified mariner may have his or her license appropriately endorsed to authorize service for a particular model of HSC on a particular route. If the route of the vessel changes, additional qualifications for the new route will be required. Information on the methods of increasing the scope of an existing HSC type rating will also be included in the information on licensing.

With regard to vessel manning, we plan to update the manning scales provided in the Marine Safety Manual, Volume III, to include HSC Code vessels. In general, vessels measuring over 100 gross tons will be required to conform to the manning levels required for conventional vessels of similar tonnage and use. HSC Code vessels measuring less than 100GT or restricted to inland voyages will required manning levels beyond that required for conventional vessels. The manning levels will be greater for these vessels because the HSC Code requires at least two licensed operators on the bridge at all times and, based on the complexity of the engineering systems of these vessels, a licensed engineer will be required.

Closing Statement.

In conclusion, the Coast Guard has maintained an active role in high-speed craft issues and is fully prepared to handle the continued growth of high speed craft operations in the United States. Recognizing that the human element plays a vital role in the safety high speed craft, the optimal approach for addressing their safety is through partnerships and the Prevention Through People (PTP) principle. The underlying goal of PTP is to reduce the risk of marine accidents associated with the human element, preferably through non-regulatory solutions. Based on mutual respect and a shared commitment by government,

industry, and labor, PTP promotes an approach to safety and environmental protection that systematically addresses the root cause of most accidents – the human element. It ensures that all aspects of ship design, construction, management and operation are addressed, including the ship's internal and external operating environments. The PTP approach will address both current and emergent issues and, most importantly, will ensure that all issues relating to the safety of high-speed craft are given the attention they deserve. So bring on the high-speed craft. The Coast Guard is ready and willing to safely integrate these vessels into the Marine Transportation System.